THE OFFICE OF NAVAL RESEARCH

Expeditionary Warfare Operations Technology Division

http://www.onr.navy.mil/sci_tech/special/353_exped/logistics.htm

SCHEDULE: (FY03 $6.25M)

TASK	FY03	FY04	FY05
EUWP AWARD	◆		
EUWP DEVELOPMENT	◆———	———	
EUWP TESTING		◆———	———
EUWP DELIVERY			◆
S&T AWARDS	◆		
S&T PHASE I	◆———	———	
S&T PHASE II		◆———	———

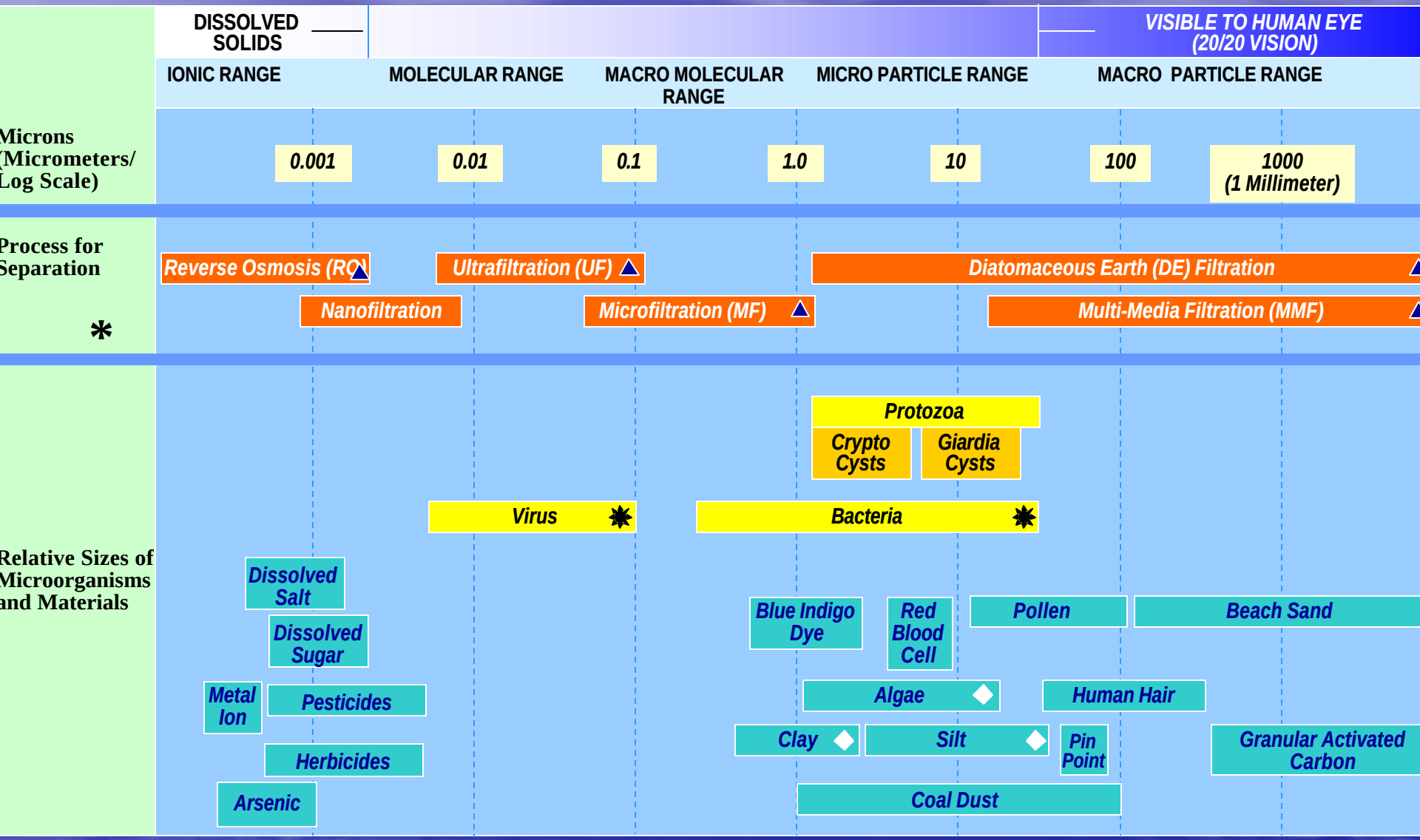
OBJECTIVES:

- Develop 100K gallons per day, C-130 transportable water purification unit (FY03 funded).
- Develop Science and Technology initiatives for application to future DoD Water Purification Systems.
- 100K EUWP demonstrator provided to the Tularosa Basin Water Research Facility: Alamogordo, New Mexico.
- Develop a 500K gallons per day C-17 transportable water purification unit (Provided FY04 funding).

PAYOFF:

- Strategic level water production capability. Humanitarian, Disaster Relief, Homeland Defense implications.
- Science and Technology insertions for future water treatment systems both military and municipal.

The Scope of U.S. Military Water Treatment Equipment



✸ *Microorganisms Also Killed by Chlorine*

◆ *Creates Turbidity in Natural Waters*

△ *RO is used as desalination method on the Reverse Osmosis Water Purification Unit (ROWPU), Tactical Water Purification System (TWPS) and Lightweight Water Purifier (LWP), MF is used as pretreatment on the TWPS; UF is used as pretreatment on the LWP; MMF is used as pretreatment on the 600 GPH ROWPU and 3000 GPH ROWPU; DE is used as filter media on the 3000 LMT.*

* *Note: These Technology Boxes Represent Typical Separation/Removal Ranges; However, Each Technology Will Remove Virtually All Solids (Dissolved Solids And/or Undissolved Particulates) Larger Than its Identified Range.*

For further information concerning this chart contact Ted Kuepper, Seawater Desalination Test Facility, NFESC, Port Hueneme, CA 93043

This chart is based upon one originally designed by Osmonics, Inc.

EUWP, Envisioned to be World's Most Advanced Deployable Desalination System

Primary Design Constraints

C130:

Capacity: 35,000 lbs;

LWH: 40ft x 9ft 11in x 9ft

HEMTT-LHS

Capacity: 26,000 lbs.

LWH: 20ft x 8ft x 8ft

Approach

- ✓ **Initial concept design and consulting provided by the U.S. Army TARDEC**
- ✓ **Further development and fabrication by contractor**
- ✓ **Preliminary testing at U.S. Navy's SDTF, Port Hueneme, CA**
- ✓ **Deliver to Tularosa Basin National Desalination Research Facility for demonstration and for use as test bed to investigate emerging technologies**

Transportability/Capacity of DoD Water Systems

C-130 (FY 03 Funded)

Cargo Capacity:	35,000 lbs.
Loadable Width:	9 ft 11 in
Loadable Height:	9 ft
Loadable Length:	40 ft

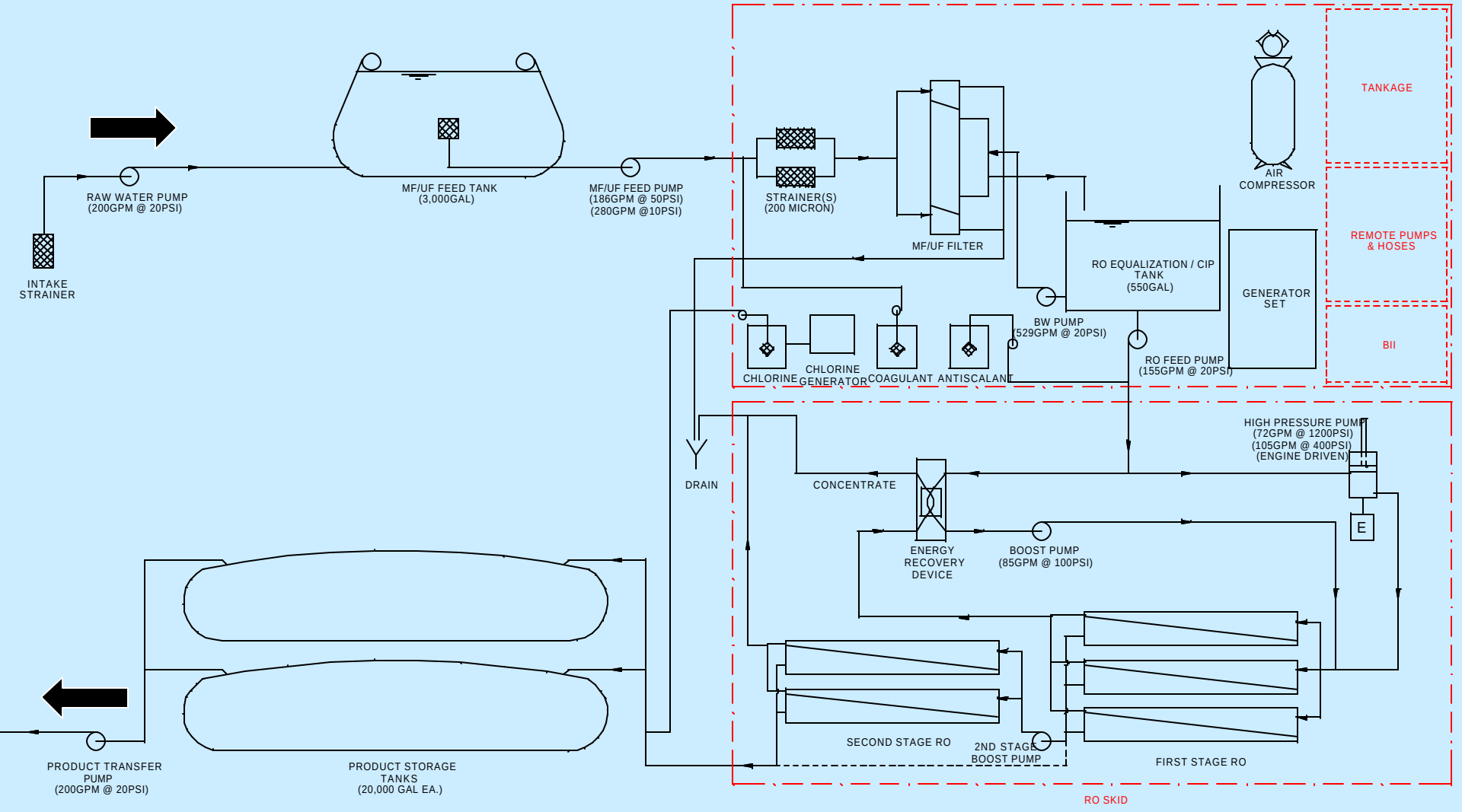
	TWPS	3k ROWPU	EUWP
• C130 Capacity:	2	1	1
• Water Production Capacity:			
freshwater (gpd)	72,000	72,000	200,000
seawater (gpd)	57,600	48,000	100,000

C-17 (FY 04 Planned)

Cargo Capacity:	170,900 lbs.
Loadable Width:	18 ft
Loadable Height:	12.3 ft
Loadable Length:	68.2 ft

	TWPS	3k ROWPU	EUWP
• C-17 Capacity:	8	4	3
• Water Production Capacity:			
freshwater (gpd)	288,000	288,000	600,000
seawater (gpd)	230,400	192,000	300,000

Concept Diagram– Research Will Address All Parts of the System



EUWP Science & Technology Efforts

Basic Research: Alternative Desalination Techniques:

(44 White Papers)

Navy Lab	Industry	Academia	Total
1	24	19	44

Approaches to reduce the costs and energetics for desalination. These efforts will likely entail modeling, detailed energy balances, and laboratory feasibility studies.

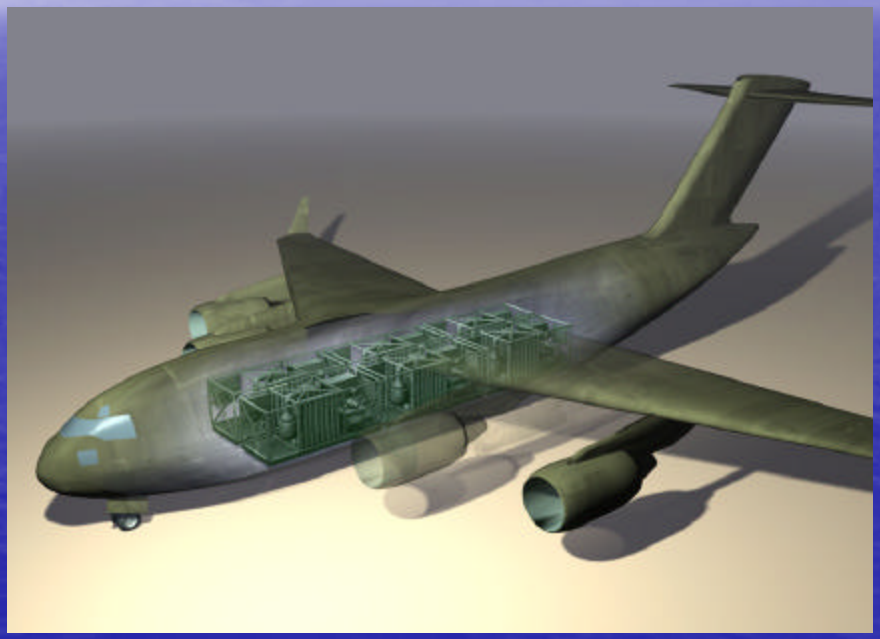
Applied Research: Improvements to Current Portable Desalination and Purification Units:

(55 white papers)

	Industry	Academia	Total
RO/Alternative Desalting	13	7	20
Utrafiltration improvements	7	9	16
Alternative pretreatment strategies	6	2	8
Energy Conservation and reclamation strategies	2	0	2
Sensors and controls	6	3	9
Post treatment and Chem/Bio disinfection	8	2	10
Brine disposal issues	1	2	3
Overall performance issues	10	1	11

C17 Options for FY04

- 300K Gallons Per Day (GPD) capacity based on C130 EUWP design.
- Goal for C17 EUWP design would be 500K GPD.
- FY 04 includes continuing Science and Technology efforts.



Back Up Slides

EUWP Integrated Program Teams

The Science and Technology IPT, chaired by Office of Naval Research, is responsible for management of S&T efforts for emerging water purification technologies and novel approaches to desalination.

The Demonstrator IPT, chaired by U. S. Army Tank Automotive & Armaments Command (TACOM), is responsible for development of the 100K EUWP Demonstrator.

The Testing IPT, chaired by the Bureau of Reclamation, is responsible for coordinating the transition of the EUWP demonstrator to the Tularosa Basin Research Facility

The Requirements IPT will be responsible for determining what general requirements apply to the program.

Identify In 2004

EUWP Improvements over TWPS:

Tactical Water Purification System

Expeditionary Unit Water Purification System

Technology	TWPS	EUWP
Desalination: Reverse Osmosis	38% recovery rate	➢50% recovery rate ➢Novel approach to membrane implementation to reduce flux
Prefiltration: Membrane-based ultrafiltration	25 gallons per square foot per day (gfd)	40 gallons per square foot per day (gfd)
Energy Recovery: Reduced energy consumption	Pressure Exchanger	➢Work Exchanger ➢Pressure Exchanger
Packaging Optimization	10K forklift requirement	➢Optimized for C130 Transport
Materials: Reduced overall size & weight	Standard Composites	➢Carbon composites for the RO pressure vessels, ➢Fiberglass reinforced plastics for low-pressure piping and pumps, ➢Lightweight, corrosion resistant metals for the high-pressure system

Distribution

Rapidly Installed Fluid Transfer System (RIFTS)

A bulk fluid distribution system (for both fuel and water distribution)

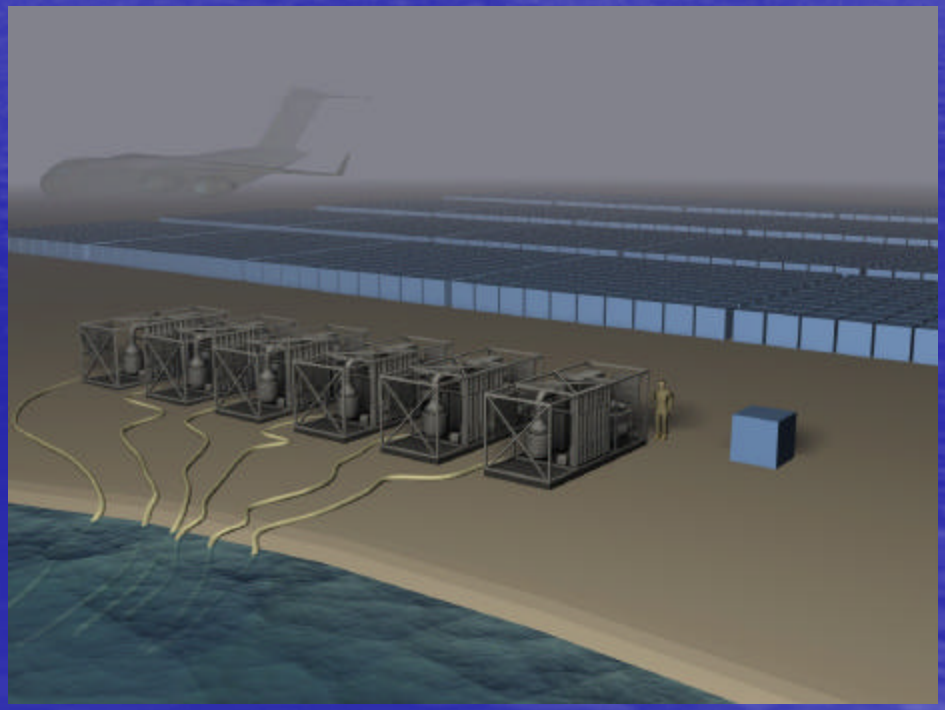
Four major modules:
- Computer Based Planning Aid (optimizes deployment trace)
- Conduit modules (deployment rate 20-30 mpd, retrieval rate 10 mpd)
- Pump Stations (throughput of 850,000 gpd; limited attendance)
- Command and Control Module (provides real-time operational status)

Advantages
- 10-fold increase in deployment rate over the IPDS pipeline set
- 50% Reduction in strategic and tactical lift
- Reduction in manpower, and MHE (use of LHS compatible vehicles)
- Environmental friendly; reduce potential leak points by 30 times

Non Military Applications
- Homeland Security (bypass contaminated water lines)
- Disaster Assistance (forest fire fighting, flood/drought

Moving Water on the Battlefield

- Distributing water on the battlefield is as much of a challenge as producing potable water.
- Current distribution systems are bulky and cumbersome to employ.
- A Expeditionary Unit Water Purification system that produces 100-500K Gallons of water per day must address distribution.



1 blue cube represents 100 gallons Image shows 200K gallons

DoD Water Research Test Facilities

U.S. Army TARDEC
Petroleum & Water
Warren Michigan

U.S. Navy NFESC
Seawater Desal Test Facility
Port Hueneme, California